Welding: SMAW I

Course Credit	1.0
Grade Levels	9-12
Prerequisites	

Welding: SMAW I is designed to provide a fundamental understanding of welding safety and basic shielded metal arc welding (SMAW) equipment and procedures. Standards are designed to equip students with knowledge and skills for setting up equipment, preparing surfaces, and performing safe oxy-fuel cutting and welding.

Career and Technical Student Organizations are integral, co-curricular components of each career and technical education course. These organizations enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and access opportunities for personal and professional growth. Students in the Architecture and Construction career cluster affiliate with SkillsUSA.

Foundational standards, shown in the table below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership qualities and take advantage of the opportunities afforded by Career and Technical Student Organizations (CTSOs), and learn and practice essential digital literacy skills. The foundational standards are to be incorporated throughout the course.

Each foundational standard completes the stem *"**Students will**..."*

Foundational Standards	
	1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces. 2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork. 3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.

	4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway. 5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

WELDING: SMAW I
CONTENT STANDARDS

Each content standard completes the stem *"**Students will**..."*

Oxy-fuel Cutting	1. Set up, leak-test, light, adjust, and shut down oxy-fuel equipment. 2. Distinguish between acceptable and unacceptable cuts, describing conditions and procedures that might have contributed to the quality of the cuts. a. Demonstrate techniques for making bevel, gouge, piercing, slot, wash, straight, and square cuts with oxy-fuel cutting machines.
Base Metal Prep	3. Clean and prepare base metals for welding. a. Describe the basic types and properties of carbon steel, and explain how these characteristics determine procedures for preparing metals for welding. *Examples: mild steel, ultra high carbon steel* 4. Prepare joints for welding both mechanically and thermally.
Weld Quality	5. Identify and describe basic weld joint designs and types, indicating characteristics of high-quality welds. a. Outline the types of information included in a welding procedure specification (WPS). 6. Identify and describe weld defects and their causes, including those related to porosity, inclusions, joint penetration, fusion, and undercutting. a. Identify and describe discontinuities that result in cracking. b. Distinguish between acceptable and unacceptable weld profiles.

SMAW Equipment and Set-up	7. Explain how voltage, amperage, and polarity apply to SMAW. 8. Identify components of SMAW equipment including cables and connectors and describe their functions. 9. Set up, operate, and maintain SMAW equipment.
SMAW Electrodes	10. Explain the classification system for SMAW electrodes and the meaning of electrode symbols. a. Explain the American Welding Society's filler metal specification system. b. Describe the characteristics of the four main electrode groups (iron powder, rutile, cellulose, and low-hydrogen). 11. Select electrodes for various situations and describe their proper storage, care, and handling. a. Strike an arc and respond to arc blow.
SMAW Beads and Fillet Welds	12. Explain how to complete various types of beads and fillet welds when welding in flat, horizontal, vertical, and overhead positions. a. Demonstrate how to start, terminate, and restart a weld pass. b. Demonstrate the proper technique required to produce stringer beads and weave beads.